

R. Stretham Waters

THE
ANALYSIS
OF

STRETHAM Waters:

WITH
A T A L E
EXPERIMENTS

That lead to a NEW THEORY of the
Composition and Decomposition

OF
MINERAL WATERS
in general.

LONDON:
Printed for M. KINGMAN, at the Royal-Exchange.

[Price Six-pence.]

THE

ANALYSIS

STRETHAM WATERS:

ERRATA

EXPERIMENTS

PAGE 9. instead of *Experiments on Stretham Waters before the Pump was fixed*, read *Explanation of the Experiments on Stretham Waters before the Pump was fixed.*

Page 15. instead of *Experiments on Stretham Waters after the Pump was fixed*; read *Explanation of the Experiments on Stretham Waters after the Pump was fixed.*

MINERAL WATERS

354. in General



[1832]

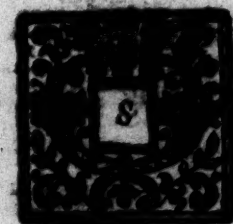


after the many that have been lately published on Mineral Waters, will relate from a Comparison of it with the Accounts given by different Authors, of **THE** Wells. It may also shew, that there is still

ANALYSIS

of Perfection we seem to be arrived at; and that a diligent and skillful Observer will seldom have Occasion to repeat an experimental Research into Subjects of

Stretham Waters, &c.



STRETHAM WELLS

are situated on the Side of a pleasant Hill, about Half a Mile from *Stretham*, in the County of *Surry*. They were discovered, according to *Aubrey*, in his *Natural Histo-*

ry of Surry, in the Year 1670, and were commonly drank in 1673.

The best Apology for this little Treatise, after the many that have been lately published on Mineral Waters, will result from a Comparison of it with the Accounts given by different Authors, of *Stretham Wells*. It may also shew, that there is still great Room for Improvement in Enquiries on such Subjects, notwithstanding the Degree of Perfection we seem to be arrived at; and that a diligent and skilful Observer will seldom have Occasion to repent an experimental Research into Subjects that may appear to have been treated with the greatest Accuracy.

Aubrey, in his *Natural History of Surry*, Vol. I. p. 215, gives the following Account of *Stretham Wells*.



“The medicated Springs here, are in
“the Ground, East of the Green: they
“have

" have a rankish Taste; they were dis-
 " covered about fourteen Years since; this
 " 1673 is the third Year they have been
 " commonly drank. It is a cold, weep-
 " ing and rushy Clay Ground, in hot
 " Weather it shoots a Kind of Salt or
 " Allium on the Clay, as in the four
 " Grounds, *North-Wilts*; it turns Milk
 " for a Posset: Five, or six Cups is the
 " most they drink, but the common Dose
 " is three, which is held equivalent to
 " nine of *Epsom*.

" In this Ground are now three Wells
 " digged, the Middlemost whereof doth
 " give a Vomit. The Locksmith that
 " dwells here on the *Green*, told me, he
 " was much consumed and very ill, and
 " went to several Physicians; some of
 " them advised him to drink *Epsom* Wa-
 " ters, which he did; but received no
 " Benefit; He then drank of the higher-
 " most Well, and on the second or third
 " Day, brought away four Worms; the

" least whereof was five Feet long, one
 " Worm that he voided was eight Feet,
 " three Inches long, attested to me by
 " several of the Neighbours, *Fide digni*,
 " the Minister that saw it measured,

" About fourteen Years since, plough-
 " ing the Ground, the Horses slipped into
 " that springy Place, which was the first
 " Discovery of this Water. Afterwards,
 " at Weeding Time, the Weeder's being
 " dry, it purged them, by which Acci-
 " dent the medicinal Virtue of them
 " was first discovered: It works also by
 " Urine as well as Sage; it is good for
 " the Eyes. A Taylor here, and several
 " others, have found much Good by it
 " for their Sight,"

" Thus far *Aubrey*, whose Account, how-
 " ever inaccurate it is with Regard to the
 " Contents of the Waters, shews; that they
 " were justly in great Esteem soon after they
 " were discovered.

" least

B 2

Doctor

Doctor *Rutty*, in his elaborate and valuable Treatise on Mineral Waters, gives an Account of *Stretham Wells*, from Dr. *Allen's* Experiments on them, and an Analysis of them, in *Dublin*, by himself; the Result is, that *Stretham Water* seems to him to be a weak Solution of a Salt, partly like Sea Salt, and partly nitrous and enveloped with a little Sulphur, and a greater Proportion of absorbent Earth than *Acton Water*, and some others. They were in Vogue at *London*, in 1744.

Having Ocaſion to go to the Wells a Twelvemonth ago, I found them ſituated on the Declivity of a pleaſant Hill, about one hundred Yards from the Houſe, on *Stretham Green*; I ſaw but two, the third had been filled up for ſome Time.

The Wells were diſtant from each other about fifteen Yards, both arched over, ſecure from Rains. They had been juſt cleaned;

cleaned; the Water taken out of the Well was clear, but from its musty Taste and a variegated Scum on Water which had lain some Time on the Ground near the Wells, I thought it must have suffered a Decomposition, and advised the Proprietor to fix a Pump, at least, in one of the Wells, which was soon after executed, and gave me an Opportunity of comparing the Experiments made on the Water exposed to the Action of Air, with those made on it when secured from Air by the Pump.

An Account of the Experiments in each State of this Water is the more necessary, as it may point out a Method of improving several Mineral Springs, and disclosing Contents and Properties in them, which are not discoverable in their present State.

The Wells were distant from each other about fifteen Yards, both reached over to the same Spring. They had been just cleaned.

Analysis

Analysis of Stenham Water before the Pump

1. It was specifically heavier than distilled Water; but lighter than common Pump-water.

2. Three Ounces, with from five to ten Drops Infusion of Galls, became whitish with light detached Clouds suspended in it.

3. With Siroop of Violet, five Drops to three Ounces, there was no Change in Half an Hour; on adding a greater Quantity of the Siroop it became greenish.

4. Olean Tartar per Deliquium, and a Solution of Salt of Tartar added to it Drop by Drop, occasioned a white Appearance in it, and precipitated a white Sediment.

5. Spirit

*Analysis of Stretham Water before the Pump
was fixed.*

1. It was specifically heavier than distilled Water; but lighter than common Pump-water.
2. Three Ounces, with from five to ten Drops Infusion of Galls, became whitish with light detached Clouds suspended in it.
3. With Sirop of Violets, five Drops to three Ounces, there was no Change in Half an Hour; on adding a greater Quantity of the Sirop it became greenish.
4. Oleum Tartari per Deliquium, and a Solution of Salt of Tartar added to it, Drop by Drop, occasioned a white Appearance in it, and precipitated a white Sediment.

5. Spirit

Experiments on Stretham Water before the Pump was fixed.

A Minute, there appeared a white Cloud, and which subsided in a little

white Sediment.

7. With Lime Water there was no Change.

2. Shews it has no Chalybeate Quality.

8. With Solution of Salt of Lead it became very white, a whitish Sediment was precipitated, which in two Hours became a little yellow.

3. This Change is effected by the Sal Cathart. Amarum, rather than by the Mineral Alkali.

9. With Solution of Sal Cathart. Amarum, the Water soon after lightly tinged with Purple, in twenty Minutes, deeper, in four Hours, a purple dark Sediment was formed.

4. Proves the Existence of Sal. Cathart. Amarum, as the white Sediment was found to be a Magnesia Alba.

11. Equal Parts of the Water boiled with Milk, coagulate it, and separate clear, pleasant Whisky.

5. Shews

5. Spirit of Sal Ammoniac precipitated a smaller Portion of whitish Sediment.
6. With Solution of Allum, in less than a Minute, there appeared a white Cloud, and which subsided in a little white Sediment.
7. With Lime Water there was no Change.
8. With Solution of Salt of Lead it became very white, a whitish Sediment was precipitated, which in two Hours became a little yellow.
9. With Solution of Silver it was first Pearl-coloured, soon after lightly tinged with Purple, in twenty Minutes, deeper, in four Hours, a purplish dark Sediment was formed: This happened on three repeated Trials.
10. Soap is soon decomposed by it.
11. Equal Parts of the Water boiled with Milk, coagulate it, and separate clear, pleasant Whey.

5. Shews the same.
6. The same, there being a greater Analogy between Acids and the Magnesia Alba, than to the Earth of Allum.
7. Shews, that there is no Mineral or Volatile Alkali in the Water, freed from Acids.
8. Owing to a double Decomposition, the Acids in the Sal Cathart. and common Salt being separated from their Bases, unite with the Lead and are precipitated with it; the yellow Colour proceeds from a Portion of the inflammable Principle attracted by the Lead.
9. Shews the Existence of the inflammable Principle in the Water, notwithstanding its being exposed to the Air.
10. Shews the Existence of a Selenitic Salt, whose Acid quits its Earth to unite with the Alkali of the Soap, which it separates from the Oil.
11. During the Ebullition, a Part of the Acid separated from its terrestrial Base, is probably the Cause.

One Quart. of the Water distilled to a Dryness, gave eighty-six Grains of a white Sediment. Four Ounces of distilled Water poured on it, dissolved all, except two Grains.

In the Solution of the Residuum in distilled Water, evaporated by Heat, parallepipied Chrystals were formed, resembling the true Glauber's Salt in Shape and Taste; but less disagreeable.

The Liquor in which the Chrystals were formed, was of a brown Colour, and tasted like a Solution of common Salt; shews, that it is Selenitic or the Vitriolic Acid united to Gypsum.

A Quantity of the insoluable Matter collected in another Trial, and ignited in a Crucible, did not acquire the Properties of Lime.

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The brownish Liquor evaporated to a Dryness, and projected on melted red-hot Nitre, sparkled and fulgurated with it.

These Experiments were made on *Stret-
ham* Waters in the Beginning of May 1758, the Weather hot and dry; and after a Drain had been made above the Wells to prevent any Rain Water that might find its Way into the Springs.

Hence, though the Result differs considerably from that of the Experiments made by Dr. *Rutty*, especially with Regard to the Residuum from Evaporation; yet he may have given a very just and accurate Account of the Water in the State it was sent to him.

The same Experiments were made on the other Spring, and the Effects were in every Respect similar.

Soon after the Pump had been fixed and seasoned in the Water, I repeated the Experiments in the former Order, and observed the following remarkable Changes.

Ex-

Experiments on Stretham Water, after the Pump was fixed.

1. With Infusion of Galls it struck a faint Purple, not only at the Pump, but in the House, and after being kept a Month well bottled.
2. With Sirop of Violets, five Drops to three Ounces, there was no Change for a Minute; it then became greenish and at last green.
3. With Solution of Salt of Tartar, and with Oleum Tartari per Deliquium, there was a Quantity of white Sediment precipitated.
4. With Volatile Spirit of Sal Ammoniac a Matter of the same Colour, but less in Quantity, was precipitated.
5. With Solution of Allum, in less than a Minute, a Cloud was exhibited, and soon after some white Matter precipitated.
6. With

*Experiments on Stretham Water, after the
Pump was fixed.*

1. A compleat Proof of its Chalybeat Property.
2. Proves as in the first Analysis; also 3,
4, 5 and 6.

7. Shews

6. With Lime Water there was no Change.

7. With Solution of Salt of Lead, it became, at first, brown, soon after, blackish, and a Quantity of dark-coloured Sediment was precipitated. From this Precipitate, fluxed with twice the Weight of pure Salt of Tartar, some Grains of Lead were separated.

8. With Solution of Silver it became almost instantly blackish, and a considerable Quantity of black Precipitate fell.

9. A Piece of Silver held in the Water, fresh pumped, was soon turned black.

10. It decomposed Soap.

11. Boiled with equal Parts Milk, it separated a Curd and clear pleasant Whey.

12. Its specific Gravity was nearly equal to that of distilled Water.

7. Shews the Existence of a considerable Quantity of Phlogiston in the Acid of Separation from the Waters. This has been generally mistaken for Sulphur united to an Alkali; but the Revival of the Lead from the Precipitate, by an Alkali, demonstrates the contrary. Indeed, much more salutary Effects may be expected from the Phlogiston thus mixed with Water, than from Sulphur.

8. Shews the same.

9. Confirms it.

10. Shews the Existence of Selenites. See *Exp. 10*, in the first Analysis, with the Explanation.

11. The same. *Vid. Exp. 10*, in the first Analysis, with the Explanation.

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On

On evaporating gently a Quart of the Water to a Dryness, the Residuum weighed as in the former Experiments eighty-six Grains, or somewhat more.

On pouring distilled Water on the Residuum, about three Grains remained undissolved.

The Solution evaporated gave Chrystals like the true *Glauber's Salt*, but of a less disagreeable Taste.

The Liquor poured from the Chrystals, contained some common Salt, and a little unctuous Matter, as appeared by its de-flagrating with red-hot Nitre.

The undissolved Matter was not reduced to Quick-lime by Ignition in a Crucible.

Instead of the musty Smell and Taste, it now smelled strongly like boiled Eggs,
the

the Washings of a foul Gun and a slight Solution of Liver of Sulphur. It also tasted manifestly like the last; so that many People in the Neighbourhood complained of it; and the Proprietor was obliged to leave one of the Wells open, in Compliance with their Prejudices against the Pump-water.

These Experiments were repeated several Times, and at the Intervals of two and three Months, always with the same Effects.

On comparing them with the Experiments made before the Pump was fixed, how remarkable the Difference?

First, The purple Colour struck with Galls, shews a Chalybeat Quality, not mentioned by any Authors that treated of these Waters.

For as the Union of the Chalybeat Particles dissolved in the Water, is soon destroyed on being exposed to the Air, such a Quality was hardly distinguishable before the Air was excluded by fixing the Pump!

How this Decomposition of Chalybeat Waters is effected, has puzzled the ablest Writers on the Subject. The Notion of a Volatile Vitriol has been long justly exploded. Dr. *Lutcas*, who has obliged the Public with an Account of what has been wrote, in general the most rationally, on Mineral Waters, attributes it to the Escape of a Volatile Acid; but as in the Distillation of *Strettham* Water, and many other Chalybeat Waters, which are soon decomposed by Heat, or when exposed to the Air, no Acid appears to exhale, from repeated Experiments. The Signs of an escaping Acid in the Distillation of Spa-Water does not prove that its Decomposition was owing to it.

The

The learned and accurate *Scippius* has given a much more probable Account; and, if not a compleat Solution of the Difficulty, it at least manifestly leads to one.

Having shewn that Waters are often mineralized by decomposed Pyrites, he says: When Chalybeate Waters are exposed to the external Air, warmer than that of their subterraneous Passage, there is an intestine Motion excited between the Acid Spirit, the inflammable Mineral Matter united to it, the Chalybeate Particles, the Alcaline Salt, and absorbent Earth dissolved in the Water.

Secondly, In Consequence of this Motion, the unctuous Matter, that prevented the Union of the Alkali and Acid in the Water, is, in Part, separated and forced to the Surface; the Acid freed from these Particles unites with the Alkali and absorbent

bent Earth, for which it quits the Iron, that either falls to the Bottom, or rises, in Part, to the Surface with the inflammable Matter, and forms the variegated Pellicle, observable on the Surface of Mineral Waters exposed to the Action of Air for a certain Time.

In the above Hypothesis, however in other Respects it agrees with Experiments, there is no Reason given why the greater Warmth of the external Air should occasion an intestine Motion, the Cause of Decomposition. In this it is deficient; and the hot Chalybeat Springs, as the Bath Water, shew, that Warmth does not, under certain Circumstances, disunite the component Ingredients of Mineral Water; for these are decomposed as they cool.

To supply this Deficiency, it is necessary to mention a few Circumstances that attend the Decomposition of certain Fossils, which, though often observed, have
never

never been applied to the Theory of Mineral Waters.

1. It is generally agreed, that Chalybeate Waters receive that Quality from decomposed Pyrites.

2. The Decomposition of Pyrites is attended with various Degrees of Effervescence, according to their Nature, Texture, and other Circumstances. Hence various Degrees of Heat may be communicated to Water in the Neighbourhood of such Pyrites.

3. During the Effervescence a Quantity of Vapour is disengaged, consisting of a sulphureous Acid and Air, which escapes with Rapidity, chiefly where it meets the least Resistance, and, in Part, mixes with the Water near it. May not the Confinement or the Inflammation of this Vapour, often be the Cause of Earthquakes?

4. Water

4. Water passing over the Pyrites, during their Decomposition, or when decomposed, dissolves the Salt resulting from the Acid united to the Iron.

5. Part of the Acid acts on the Iron, and unites with it. Both the Acid and the Iron thus united are deprived of the elastic Air that entered their Composition:

6. If the Water was previously impregnated with fossile Salt and Selenitic Particles, a Decomposition necessarily happens from its Action on the Vitriolic Salt; for the Acid of Vitriol, from its greater Analogy to the Alkaline Basis of the fossile Salt than to Iron, unites to it, and forms a Salt resembling either *Glauber's*, or the *Epsom* Salt, should the fossile Salt contain a Portion of a particular absorbent Earth. The Saline Acid being disengaged, unites partly with the Earth of the Selenites, which it retains dissolved, in Consequence of

of the Decomposition of the Pyrites, from the Action of their Sulphur on the Iron, which enters their Composition, an elastic, inflammable Vapour is raised, which occasions the particular Smell, not unlike that of the Washings of a foul Gun.

This Smell is observable constantly at the Spring-Head, where the Vapour escapes into the Air. The Part of it which is united to the Water in the subterraneous Passage, gives that Pungency perceived in Mineral Waters drank at the Source; which is soon lost by the Escape of the Vapour, unless great Precautions are used to confine it.

For, as when the Water is exposed to the Air, the Decomposition goes on more rapidly on Account of the Evaporation of the Volatile Vapour, as fast as it is disengaged, the Vitriolic Acid being now totally separated from its metallic Basis, deprived of the inflammable Principle, carried off in

E

Part

Part by the Vapour, and partly left on the Surface of the Water; the metallic Particles, I say, thus reduced to an Ochre, either sink to the Bottom, or, being some of them extremely divided, rise to the Surface and form, with Part of the other separated Materials, the variegated Scum observable on the Surface of Mineral Waters, particularly the Chalybeat.

The following Experiments, which are neither expensive nor troublesome, are sufficient to demonstrate the above Theory.

EXPERI-

EXPERIMENTS.

1. Pour Spirit of Vitriol on Filings of Iron, a considerable Effervescence will ensue, white Vapours will be disengaged, which take Fire with Explosion on applying a lighted Paper to them; let this Vapour be conveyed and mixed with some Water in a Florence Flask, the Water will smell like the Washings of a foul Gun,

2. Spirit of Salt poured on Filings of Iron will exhibit the same Phenomena.

3. A Mixture of Sulphur and Iron Filings moistened with Water produces the same Effects.

The Pyrites are composed of Sulphur and Iron; some Sorts of them moistened may consequently exhibit the same Phenomena.

4. Mix a Solution of common Salt with a Solution of green Vitriol, on examining the Solution after a few Days, an Iron Ochre will be found at Bottom, sometimes a variegated Scum on the Surface, especially if the Experiment is made in large shallow Vessels; on evaporating the Solution, Salt resembling *Glauber's* and a Sal Catharticum Amarum will be found.

The three first Experiments demonstrate the Truth of our Hypothesis with Regard to the Smell of Chalybeat Waters; the last proves the Decomposition of the fossile Salt and Vitriol, with their new Combinations.

Hence it is that Vitriol is rarely, if ever, obtained by evaporating Chalybeat Waters; because, during the Evaporation, if there is any fossile or common Salt in the Water, there is a Decomposition, and the Vitriolic
Acid

Acid quits it metallic Base to unite with the Alcaline Basis of the Salt.

Stretbam Water, therefore, contains an elastic sulphureous volatile Spirit, a small Portion of Iron extremely divided and subtilized, a Quantity of *Glauber's* Salt, *Sal Catharticum Amarum*, and a little Selenitic Salt. The two first Ingredients, which have been so long unnoticed, render it one of the most powerful medicated Springs in *Great-Britain*, or perhaps, in *Europe*.

Whether we consider it with Regard to internal or external Use, it would be extremely difficult to combine with so active and innocent a Vehicle as Water, Ingredients so manifestly calculated to remove scrophulous Complaints, cutaneous Foulnesses, white Swellings, Weaknesses and Obstructions of all Sorts.

Equal Quantities of the boiling Water and the cold make a Mixture of the same
Tem-

Temperature, and equal Virtues with the Bath Water. Happy Resource for such as cannot, on Account of the vast Expence or other Inconviencies, go to the Bath.

The other Ingredients render it a safe and pleasant Purgative or Alterative, according to the Quantity; a Quart is generally enough to answer the first Intention, and a Pint every Morning the latter.

The preparatory Course for drinking this Water, is by no Means fatiguing, a Bleeding and a Dose or two of gentle Physic being sufficient. The Patient, after going through the general Preparation, should begin with drinking the Water deprived of the Chalybeat Quality, by being exposed to the Air. Having drank this for a Week or a Fortnight every Day, or three Times a Week, according to his Constitution, or the Nature of his Complaint, he should then drink a Glass of the Water in its full Perfection, and a Glass of the former

former alternately ; for Example, a Glas, or two Glasse of each every Morning, or three Times a Week for another Fortnight. Lastly, he should drink the Water in as great Perfection as possible for two Months or more, using it externally, if his Case should require it. Glas Bottles properly filled at the Spring Head, have retained all the Qualities of the Water for two Months and upwards.

A Number of Cases might be brought to attest the extraordinary Efficacy of this Water, both in the Disorders already mentioned, and in Weakness of the Eyes, &c.

But it was thought unnecessary, as this little Treatise was wrote, rather to let the Public know, that these salutary Waters, which had been so long withheld from it by the Indolence and Neglect of the late Proprietors, are now, by the Industry of the present Proprietor, at a very great Expence, restored to it, in greater Perfection than ever.

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